The Effect of the Patient Centered Medical Home on Cervical Cancer Screening Rates in a Navy Family Medicine Clinic

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Abstract

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Background: Since the introduction of cervical cancer screening tests such as the Pap smear, cervical cancer, once a common cause of cancer death in women, is now an infrequent cause of morbidity and mortality. Recognized as one of the most preventable types of female cancers, the 2008 screening rate in the US was 84.5%. The U.S. Department of Health and Human Services' Healthy People initiative aims for a 93% screening rate by 2020. It has been hypothesized that the Patient-Centered Medical Home (PCMH) can assist in achieving this critical preventive health goal.

Methods: This cross-sectional study was designed to test if the implementation of the PCMH model was associated with improved cervical cancer screening rates in a Navy family medicine clinic. The primary outcome was the up-to-date cervical cancer screening rate during the specified time periods, before implementation in 2008 and after implementation of the PCMH in 2012. A secondary outcome compared the cervical cancer screening rates between active duty females in the pre- and post-implementation groups. Regression analysis was utilized to show if an association between up-to-date cervical cancer screening status and the PCMH existed.

Results: The post-PCMH group screened a higher proportion of females than the pre-PCMH group, with a statistically significiant difference (75.9% vs. 83.5%, $p<0.001$). Among the active duty population in the two study groups, there was a small drop in screening rates in the 2012 group compared to the 2008 group, but was not statistically significant (94.3% vs 91.5%, $p=0.315$). Regression analysis suggests that the older the age of a woman, the stronger the effect the PCMH had on her Pap status being up-to-date.

Conclusion: The implementation of the PCMH was associated with improved cervical cancer screening rates at a Navy family medicine clinic, and more strongly associated in women over the age of thirty-six.

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Background

History of Cervical Cancer

Throughout the world, cervical cancer is diagnosed in over a half million of women and kills a quarter million of women each year[1,2]. Approximately 85% of cervical cancer deaths occur in less developed countries[1,2] where access to screening, diagnosis and treatment is limited. In many of the developed countries, including the United States, established screening programs have been associated with decreased rates of cervical cancer[3]. In the United States, when a test called the Papanicolaou (Pap) smear was first introduced, cervical cancer was the leading cause of cancer deaths among women[4]. Since the introduction of the Pap test, now a standard cancer-screening test for women, there has been a dramatic decline in both the rate of new cases and deaths caused by cervical cancer[4-6].

Cervical cancer is now considered to be rare, ranked as the third most common gynecologic cancer[7] and ranked fourteenth in cancer deaths in women[8]. Although the American Cancer Society projects that in 2014, 12,360 new cases of cervical cancer will be diagnosed and cause 4,020 deaths[9], the CDC reports that cervical cancer is the easiest and most preventable female cancer[10].

Cervical Cancer Prevention and Screening

Nearly all cases of cervical cancer are associated with the human papillomavirus (HPV)[2]. In the United States, HPV infection is the most common sexually transmitted infections among both men and women[11]. Two HPV vaccinations are approved by the FDA, Cervarix™ and Gardasil™[12-14]. Cervarix™ prevents two HPV types: HPV 16 and 18, which causes 70% of cervical cancers. Gardasil™ prevents four HPV types: HPV 16 and 18, and HPV 6 and 11[12]. The vaccine does not prevent infection from all HPV-associated viruses that have the potential to cause cervical cancers, but targets the high-risk sub-types of the virus. Unfortunately, the vaccine does not affect current infections, slow disease progression or treat HPV-caused disease[15]. Although these two vaccinations are readily available and recommended for adolescents, uptake of the vaccines has been slow[3,16].

The goal of cervical cancer screening is to prevent morbidity and mortality caused by cervical cancer[16]. The standard screening method for cervical cancer in the United States continues to be the Pap test, along with a highly sensitive HPV DNA test[17,18]. The main purpose of the Pap test, a cytological test, is to identify any abnormal cells, including pre-cancerous and cancerous cells, within the transformation zone of the cervix. A sample of cells is taken from the endocervix, examined under a microscope and analyzed either manually or by a computer. The HPV

DNA test[19] also involves sampling cells from the cervical opening, but instead of identifying abnormal cells, it detects the presence of DNA from several high-risk HPV types that pathologically affect the cervix. As with most clinical screening tests, the Pap test and HPV test are not diagnostic of cervical cancer, but are highly sensitive in its ability to detect potential precursors of invasive cancer [16,18].

The United States Preventive Task Force (USPTF) recommendation statement for screening[18] applies to all women who have a cervix, regardless of sexual history, but does not apply to women who have received a diagnosis of a high-grade precancerous cervical lesion or cervical cancer, women with in utero exposure to diethylstilbestrol (DES), or women who are immunocompromised, such as those who are HIV positive. The recommended screening interval is every three years with a cytological Pap test for women between the ages of twenty-one to sixty-five[18]. In women ages thirty to sixty-five, there is substantial evidence that screening with both the Pap test and HPV test every five years provides similar screening benefits to the three-year interval testing with the Pap cytology alone. The HPV test is not recommended by the USPTF as a screening test in women who are younger than thirty, as evidence shows there is little added preventive benefit. Because the prevalence of HPV infection is already high in this population, it is estimated that the majority of women under thirty who have abnormal Pap tests are presumed to be infected with HPV[16,18,20,21].

In the United States, most women who are diagnosed with cervical cancer have either received little or no screening[16,22,23]. Preventive screening has greatly reduced the disease burden of cervical cancer, with the five-year survival rate of women diagnosed between 2004-2010 at 69%[5]. In general, early stage cervical cancer has a high 5-year survival rate of 90%[9,16]. Even though morbidity and mortality related to cervical cancer has dramatically declined, there exists a subpopulation of women who suffer from cervical cancer rates that are similar to the rates observed in developing countries[16]. This is mostly due to limited or no access to health care and preventive services[24]. This subpopulation of women tends to be comprised of the uninsured, those living in a medically underserved area or non-metropolitan area, those with a lower socio-economic status and individuals more likely to be recognized as a racial/ethnic minority[25-30].

Disparities in Cervical Cancer Screening

Historical and current trends in the United States show persistent disparities in cervical cancer screening between racial and ethnic groups[31]. Since the 1950s, black women have died more often from cervical cancer, with a two- or three-fold higher mortality rate than white women[6,27,29,30,32,33]. Whites have the lowest incidence of cervical

cancer, 7.7 cases per 100,000 women, and the lowest cervical cancer mortality rate, 2.2 deaths per 100,000 women. African Americans have a slightly higher incidence (10.7 cases per 100,000 women) and mortality rate (4.4 deaths per 100,000) than American Indians and Alaska Natives (9.7 cases per 100,000 and 3.4 deaths per 100,000)[5]. Currently, out of all minority populations, Hispanic women have a 50% higher rate than non-Hispanic whites[9], with 12.5 cases of cervical cancer per 100,000 women and the highest morality rate, 3.1 deaths per 100,000 women[5].

There is considerable evidence[28,29,34-38] to support that having a lower socioeconomic status (SES) and a higher poverty level increases a woman's chance of being diagnosed with cervical cancer. One study, using census data between 1975 and 2000, showed that cervical cancer mortality mainly increased with increasing poverty and decreasing education for all women, regardless of racial/ethnic groups. American Indians who lived in low SES areas of the U.S. have more than twice the mortality of their peers in high SES areas. Women who lived in low poverty census areas were 20% more likely to be diagnosed with a distant-stage cervical cancer and have a lower 5-year survival rate, with Hispanics being the most affected[39].

Women who have health insurance are more likely to be screened for cervical cancer than women who are uninsured[40-43]. In a study of Oregon community health centers, having continuous insurance was associated with a higher likelihood of being screened for cervical cancer compared to those women without insurance[40]. Another cross-sectional study showed that even among higher-income adults, not having insurance was linked with a lower utilization rate of preventive health care services, including cervical cancer screening[41].

In addition, there exists a marked disparity in screening and mortality rates between women who live in rural or non-metropolitan areas and women who live in metropolitan areas[27,28,37]. After controlling for stage of disease, one cohort study showed that women in non-metropolitan areas had a significantly higher incidence of cervical cancer, higher mortality rates and lower survival rates compared to women in metropolitan areas[27,28,37]. It has been hypothesized that racial and ethnic status and neighborhood composition may have a synergistic effect on cervical cancer[28].

In order to address these health disparities, several government-run organizations have made it a priority to increase cervical cancer screening in all women, especially in vulnerable populations. By congressional order, the CDC started the National Breast and Cervical Cancer Early Detection Program (NBCCEDP), which is available in all fifty U.S. states and offers low-income, uninsured and underinsured women access to breast and cervical cancer screening[44]. In addition, the Healthy People program was established by the United States Department of Health

and Human Services[45]. Every decade, Healthy People defines its 10-year nation-wide health-promotion and disease-prevention goals and objectives for improving the health of every American[46]. Reducing the overall morbidity and mortality related to cancer is one of the goals identified by Healthy People 2020[47]. There are three specific Healthy People 2020 objectives involving cervical cancer: reduce the cervical cancer death rate, reduce the rate of invasive cervical cancer and increase the proportion of eligible women[18] that receive cervical cancer screening. In 2008, the screening rate in the United States was 84.5%. The target screening rate by 2020 is 93%[47].

Patient-Centered Medical Home

Most women receive preventive health care screening, including preventive cancer screening such as Pap tests, from their primary care providers. Individuals who receive most of their health care from a primary care provider are more likely to receive appropriate preventive care and experience fewer health care disparities[48-51]. However, under the traditional model of health care delivery in the United States (described in detail below, see History of Healthcare in the United States), providing quality and equal access to primary care has been difficult to achieve[52,53]**.** Due to the unsustainable and expensive nature of how U.S. health care is delivered, the United States is currently experiencing a major reform to improve the delivery of health care services[54]. While the United States undergoes its current health care reform, health care organizations view the patient-centered medical home (PCMH) as the most appropriate model for how primary care should be organized and delivered throughout the United States health care system[54,55].

The PCMH concept was first introduced in the pediatric community in 1967[56] as a way for pediatric specialists to better care for children with special health care needs. Initially, the PCMH was defined as "one central source of a child's pediatric records and emphasizes the importance of centralized medical records"[56]. Eventually, the PCMH was redefined as "a partnership approach with families to provide primary health care that is accessible, family centered, coordinated, comprehensive, continuous, compassionate, and culturally effective"[57]. In response to wanting to successfully meet patients' needs in the constantly changing health care environment, the American Academy of Family Physicians (AAFP) created "The Future of Family Medicine: A Collaborative Project of the Family Medicine Community" in 2002[58]. The project stated that "every American should have a Personal Medical Home that serves as the focal point through which all individuals—regardless of age, sex, race, or socioeconomic status—receive their acute, chronic, and preventive medical care services[58-60].

Along with the American Academy of Pediatrics, the American College of Physicians and the American Osteopathic Association, the AAFP's Future of Family Medicine aims to uphold the seven principles[59,60] of the PCMH by: providing all individual patients with a personal physician; administering patient care by a physician-directed medical practice; having a physician who is responsible for providing whole-person care; encouraging coordinated and integrated care; providing safe and quality health care; providing enhanced access to care; and establishing a payment system that recognizes added value the PCMH provides. In other words, the goals of this physician-coalition are to make health care "accessible but also accountable, comprehensive, integrated, patient-centered, safe, scientifically valid, and satisfying to both patients and their physicians"[59-61].

History of Healthcare in the United States

For the early part of the twentieth century, primary care in the United States was typically delivered in a more physician-centered manner via an independent physician who acted as a gatekeeper for his patients. Physicians provided care to individuals in their homes and would receive direct payments for each type of health service rendered. Medical technology was limited and so much of what a physician provided was inexpensive[62,63].

Before the 1920s, commercial insurance companies did not think that health could be an insured commodity because health behavior was difficult to predict. Insurers feared that moral hazard[64], a concept that individuals engage in risk-taking behavior once insured, would make a significant impact on the health of the insured. Overall, there was a low demand for health insurance, but 'sickness' insurance was often purchased, which was the equivalent of modern-day disability insurance.

As physicians learned more about diseases and as treatments and medical technology advanced, they began to charge their patients more for health care. Additionally, as medicine was increasingly recognized as a science, hospitals where this new medical technology could be administered became treatment centers for ill patients. This shift from treating patients in the home to treating them in hospitals was one of the first contributing factors that increased the cost of health care. And, as the U.S. population shifted from living in rural regions to urban city centers and with incomes rising, the demand for health care and insurance rose[63].

The quality of both physicians and the care they provided improved after the American Medical Association (AMA) created the Council on Medical Education (CME) to standardize the requirements for medical licensure. The CME invited Abraham Flexner to evaluate medical education in the United States. According to Flexner, the

methods of medical education had "... resulted in enormous over-production at a low level, and that, whatever the justification in the past, the present situation... can be more effectively met by a reduced output of well-trained men than by further inflation with an inferior product". Flexner argued for more stringent entrance requirements, improved educational and clinical facilities, higher fees, and overall, tougher standards. After the Flexner Report was released, the number of medical schools in the United States dropped[62].

Together, the increased requirements for physician licensure, education and the accreditation of medical schools restricted physician supply, put upward pressure on the costs of physicians' services. With these requirements increasing for medical licensure, and as demands for medical care rose, health care costs continued to rise to financially unmanageable levels[62,63,65].

To address the increased demand for care, pre-paid hospital service plans were developed over the course of the Great Depression. For a fixed amount of money, an individual was allowed a set number of treatment days in the hospital. This type of insurance was the precursor to BlueCross® and BlueShield® insurance, which encouraged other insurance companies to provide health care insurance[62,65]. With World War II came a shortage of labor. As a result, employers offered health insurance as a job incentive. Employer-based health insurance soon became commonplace with the government offering tax incentives to those employers[62].

Initially, the early non-profit pioneers BlueCross® and BlueShield® charged the same insurance premiums to all individuals. However, when private and for-profit insurers entered the marked and charged premiums based on age, health status and pre-existing health condition, the non-profit insurers followed suit. Profits increased, as the healthiest people were insured and the sickest were not. While other countries were establishing a national health care system, the United States, lobbied by the American Medical Association and insurance companies, were able to avoid government involvement in health insurance.

Between the 1940s and 1960s, more and more commercial insurance companies entered the market, and the supply of health insurance rose. The use of healthcare also continued to increase as medical technology advanced and became more sophisticated. The government encouraged employers to offer health insurance. By 1960, private insurance was firmly established in the United States. However, there still existed a population of day laborers, workers for small companies, the self-employed, the poor and unemployed, and those over 65 years old who lost their insurance once they retired from their jobs. Medicare, insurance for the elderly population, and Medicaid, insurance for the indigent population, were eventually established by the federal government to address this often

medically needy population. Federal spending on Medicare significantly increased once the reimbursement policies changed. Instead of paying physicians typical rates, the government began a system of set payments based on diagnosis. Health care costs initially remained stable but sharply rose again due to generous eligibility requirements that were enacted in the 1990s. By 2001, Medicare and Medicaid were responsible for approximately 32 percent of all health care spending in the United States[62].

In response to rising health care costs and to reduce out-of-control spending, the government shifted federal health policy towards managed care and passed the 1973 HMO (Health Maintenance Organization) Act. In contrast to the traditional fee-for-service model, where insurance companies did little to intervene with medical decision making, managed care groups called Health Maintenance Organizations (HMOs) took an active interest in the health of their enrolled patients[62].

The goals of most managed care groups were to improve health through preventive care, reduce unnecessary utilization of costly health care services, reduce overutilization of health care systems and standardize the widely variable quality of care that most patients received in the traditional fee-for-service model. Several private insurance companies shifted to the HMO model of care and this model became the dominant form of health care delivery for most of the 1990s and early 2000s[66], but most physicians and patients disliked the limited choices and need for authorizations for referrals and certain services[67]. The managed care model pushed more providers to leave group practice HMOs and join preferred provider organizations (PPOs), where attempts to decrease costs and improve the quality of care were typically less systematic than those practiced by HMOs. Because of the limitations of managed care, providers in the U.S. chose to practice in solo, small partnerships or small group practices paid largely on a fee-for-service basis. Historically, the reimbursement for fee-for-service care and for capitated health care has not incentivized preventive health care. As insurance reimbursement rates have dropped, more providers have increased the volume of patients they see in an effort to maintain a financially sustainable level of income. This increase in patient volume has caused providers to spend less time with patients to deliver preventive health care[68]. It has been argued that this type of system is poorly designed to prevent illness and treat chronic illness[63,65,67].

History of United States Military Medicine

The history of military health care dates back well before the Civil War. There was no centralized medical system. Health care was provided at the local level and remained limited. Most care was primitive and rendered by

Army regimental surgeons and surgeons' mates. In the 1880s, Congress directed that "medical officers of the Army shall whenever possible attend the families of officers and soldiers free of charge"[69].

During World War I, the U.S. Army Medical Department organized and expanded their medical capabilities. Care was first rendered on the battlefield and then transferred to higher and better levels of care. Expansion continued during the World War II, but still no structured health care system existed. Most military personnel were young with wives of childbearing age and the military medical infrastructure could not handle maternity care, or pediatric care. In 1943, the Emergency Maternal and Infant Care Program (EMIC) were authorized by Congress. EMIC provided maternity and pediatric care up to one year after the birth of the child for those families of lower-ranking status.

After the Korean conflict, in 1956, the government passed the Dependent Medical Care Act and in 1966, amendments to this law, the Military Medical Benefits Amendments, created the program known as Civilian Health and Medical Program of the Uniformed Services (CHAMPUS). This law provided health care for active-duty family members. Retirees, their family members and some surviving family members of deceased military spouses were qualified to receive health care.

In the 1980s, because of rising costs and beneficiary dissatisfaction, the Department of Defense (DOD), created a CHAMPUS Reform Initiative (CRI). The CRI project was the first to introduce elements of managed care to the CHAMPUS system, allowing families to choose where they receive their health care benefits. With the success of the CRI project, the 1990s saw the creation of TRICARE, a managed care program established in twelve health care regions. Although it has undergone significant re-structuring, TRICARE remains the single-payer health care insurance for families of military members.

Healthcare Reform: Affordable Care Act and the PCMH

In response to the high costs of health care, a growing population with preventable but chronic diseases, and the increasing rate of the uninsured[39], the Patient Protection and Affordable Care Act was introduced and signed into law by President Obama in 2010[70]. Within the Affordable Care Act[71], there are provisions regarding the establishment and promotion of the patient-centered medical home (PCMH). The PCMH model has fundamental features that distinguish it from the traditional care delivery model: integration of health information technology,

patient-centered engagement in care, and a team-practice approach.[72] The PCMH model is at the forefront in providing affordable and efficient, quality healthcare during this time of healthcare reform[24,73-77].

The adoption of the PCMH model has been heavily promoted and encouraged because of anticipated and observed health-care benefits[47,59,68,78-83]. Studies of pilot and established medical homes have shown improved health outcomes[47,71,78,81,82,84-87]. Several studies suggest that successful PCMH implementation lead to decreased emergency room visits, increased access to preventive services, lowered costs, improved quality and created more positive patient and provider experiences[59,71,78,79,82,84,87-95].

A prospective study in 2009 by Reid et al examined the differences in patient experiences, staff burnout, quality of care, utilization, and costs before and after the first year of a pilot PCMH study in western Washington[94]. The study demonstrated improvement in patient experience, improved quality of care with staff experiencing less burnout at 12 months after the first year of PCMH implementation. One among many of the quality indicators studied was preventive cancer screening and included cervical cancer screening. However, although the study reported a significant improvement of quality of clinical care, it did not specifically report by how much preventive cancer screening was improved[94].

Several principles of the PCMH appear to be well suited to help primary care providers specifically address and potentially improve cancer screening prevention[68,82,96 47,78,79,92,94,97]. These principles include: having an established relationship with a personal physician for continuous and comprehensive care; a physician-directed multi-disclipinary team that cooperatively cares for the patient; patient-focused preventive, acute, chronic care and end-life-care; coordinated care within the health care system and the individual's community; providing quality and safety through evidence-based care and information technology; enhanced access with easier scheduling and improved communicaiton tools between staff, physicans and patients; and a payment system that reflects value and quality of care[59,60].

Although the PCMH model has been extensively studied in its early implementation period, research on its impact on preventive cancer screening has been limited. At least two review articles[48,68] have highlighted the potential for the PCMH to improve the delivery of cancer screening. Although primary care saves money and improves health disparities, Wender et al[48] reported that within the traditional health care delivery model, only approximately half of all recommended preventive services are consistently delivered. Because the PCMH concept relies on using teams, leveraging information technology, defining practice policies, and tracking enrolled patients[48],

Wender and Altshuler argue that the PCMH could have a significant impact on improving cancer prevention and decreasing overall cancer morbidity and mortality. All of these PCMH-related factors may potentially decrease the burden of cancer by identifying patients who are due for cancer screening tests, detecting cancer earlier, and improving the process of communication with patients after the cancer screening tests are completed.

Sarfaty[68] emphasized that there exists sufficient evidence to support the effectiveness of the PCMH on chronic disease prevention and management. However, current PCMH demonstrations have infrequently measured preventive services outcomes, including cancer screening. Because data shows that what does or does not occur in the primary care setting has a considerable impact on cancer outcomes, Sarfaty argues that the PCMH could play a major role in promoting cancer screening. Although challenging to implement and sustain, the PCMH model should facilitate coordination and delivery of frequent preventive exams, use of registries to store cancer risk factor information, tracking of test results, organizing specialized cancer care and receiving financial incentives for the delivery of cancer screening[68]. Another review[75] of cost quality analysis reported specific improvement in colorectal, breast and cervical cancer screening in three states where pilot medical homes had been established.

In total, little attention has been focused on explicitly measuring how the medical home may affect and improve preventive cancer screening. However one study supports the association of the PCMH and improved colon cancer screening rates. This retrospective analysis by Schweitzer[96] showed an improvement in the colorectal cancer screening rates after the implementation of the PCMH. Based on the improved colorectal screening rates, it was projected that other screening rates, including cervical cancer screening rates, could also improve. No studies to date have examined whether there is an association between increased cervical cancer screening rates delivered within the PCMH model compared to cervical cancer screening rates in the traditional fee-for-service model of health care.

Military Health System and the PCMH

Within the Military Health System (MHS), TRICARE™ is the health care insurance program for military service members who are active, guard/reserve or retired and their families. TRICARE was created in 1996. Previous to TRICARE, beneficiaries of military health care were provided with episodic acute and routine medical care. Patients were not assigned to a specific primary care manager (PCM) or specific clinic. In order to better manage the primary care of military beneficiaries, the PCM by Name (PCMBN) policy was implemented in 1999. The

PCMBN policy was created in order to assign one primary health care provider to each beneficiary (or family members of beneficiaries), ensuring that patients had access to medical advice and provider continuity in all non-emergency medical situations[32].

However, in 2008, due to growing patient concerns about access to quality care and fragmented relationship with their PCM, the MHS leadership decided a change was in order to improve the health and satisfaction of its beneficiaries. The MHS directed TRICARE to develop an effective model of primary care. TRICARE chose the PCMH model as the framework to deliver primary care within all branches of the MHS[32,98].

Subsequent to its implementation, the military medical home has been associated with improvements of access to care, decreased health care costs, reduction of emergency department visits, improvement in population health/HEDIS[99,100] measures, and a high degree of hospital staff satisfaction[47,86,87]. Within the Air Force and Army MHS, there have been noteworthy increases in continuity of care, patient satisfaction and decreased emergency room use[86]. Since the United States Navy's military treatment facilities (MTFs) implemented the PCMH model, there has been a 19% increase in the continuity of care at one major Naval Medical Center[86]. Additionally, there exists one unpublished study[96] that examined the impact of the PCMH within a United States Navy primary care clinic on a specific preventive cancer screening measure: colorectal cancer screening.

One of the four goals (i.e. Quadruple Aim) of the Military Health System's PCMH model is to "improve the beneficiary population's health by encouraging healthy behaviors and reducing the likelihood of illness through prevention"[32]. In 2008, the cervical cancer screening rate within Naval Hospital Bremerton's (NHB) family medicine clinic was 79.5%, compared to the national 84.5% average of the United States during that same time.[26,47] In July 2010, NHB began a phased implementation of its own PCMH (Medical Homeport™)[90] in one section of its family medicine clinic. In July 2011, the complete integration of the PCMH into all sections of the family medicine clinic was accomplished. Within the Medical Homeport™, additional focus was placed on preventive health measures, including proactive use of patient lists to contact those "overdue" for recommended screening tests, including cancer screening tests and exams[96].

In order to achieve the federal government's Healthy People 2020 goals of reducing the overall burden of cancer and reach the national target cervical cancer screening rate of 93%, it is hypothesized that the PCMH model of care can assist in achieving this critical population health goal[32].

The purpose of this cross-sectional analysis was to determine whether the military's PCMH model was associated with an improved cervical cancer-screening rate at a United States Navy family medicine clinic at Naval Hospital Bremerton in Bremerton, Washington between the years of 2008 and 2012.

This study was approved by the Institutional Review Boards (IRB's) of the University of Washington and the Navy Medicine Western Region.

Methods

Study Design

This is a cross sectional analysis comparing cervical cancer screening rates before and after the implementation of the PCMH. The rationale for choosing a cross sectional study design is that it is a practical method for quantifying the prevalence of a risk factor or exposure and prevalence of an outcome[101]. The purpose of many cross-sectional studies is to find the prevalence of an outcome of interest for a population during a particular time frame. These study types are also carried out to investigate associations between risk factors and an outcome of interest. Additionally, these analyses tend to be less time-consuming, require no follow-up over time, cost less money to complete and can be generalized to a target population[101]. The decision to use a cross-sectional design for this study was to quickly assess the effectiveness of a particular exposure (PCMH model of care) on an outcome of interest (cervical cancer screening rates) within time and financial constraints.

The data set was obtained and formulated from pre-existing data extracted from the Military Health System Population Health Portal (MHSPHP). The methodology is fully explained in Appendix B.

For the purpose of this study, a patient-centered medical home will be defined according to the definition given by the National Committee for Quality Assurance (NCQA)[88,102] as well as the Military Health System Patient-Centered Medical Home Guide[32] (see Appendix A).

In this study, the primary outcome was the prevalence of cervical cancer screening rates in the setting of the primary exposure, the PCMH.

Study Population and Subject Selection

Naval Hospital Bremerton[103] is a 36-bed community-based hospital that serves military health beneficiaries of the greater western Puget Sound of Washington state. This study took place in Naval Hospital Bremerton's family medicine clinic. The study population was drawn exclusively from women, between the ages of twenty-four and sixty-four who were currently eligible to receive cervical cancer screening according to the latest clinical practice guidelines. The majority of women included in this study population were family members of either active duty or retired active duty service members. These women were previously assigned a primary care manager within the

family medicine clinic, had to have received all of their primary care in this clinic for as least the previous thirty-six months.

Inclusion Criteria

All females between the ages of 24 – 64 years were eligible for this study if they were a continuously enrolled in the military health insurance program, TRICARE, at Naval Hospital Bremerton's family medicine clinic, during the preceding 36-month period without a documented hysterectomy in the 365 calendar days of 2008 or 2012. Data from 2008 is labeled as the time period of 'pre-implementation of the PCMH' and data from 2012 is labeled as the time period of 'post-implementation of PCMH'. This identified population included women who were active duty, retired military or were family members of active duty or retired personnel.

Exclusion Criteria

Females enrolled at NHB's family medicine clinic were not eligible for this study if they had a documented history of hysterectomy, without a residual cervix in the electronic medical record. Since evaluation of appropriate cervical cancer screening requires a retrospective approach, female patients were not included until reaching age 24, which allows for a three-year look-back to the earliest possible age they are currently recommended by the U.S. Preventive Services Task Force[18] to begin cervical cancer screening.

Sample Size Estimation

For the pre-PCMH group, 6023 patients met inclusion criteria. 5537 patients met inclusion criteria in the post-PCMH group. In order to have an 80% power to detect a change in cervical screening rates of 5% (75% →80%) between the pre-PCMH and post-PCMH groups, this study needed at least 870 study participants in each group[55]. The final sample sizes had more than adequate power to detect the differences in the cervical cancer screening rates.

Data Collection

Study data was obtained from pre-existing data extracted from the Military Health System Population Health Portal (MHSPHP). This database obtains data from mulitple sources for analysis and use in optimizing patient care.

These reports include patient lists for each provider showing enrolled patients who are eligible for cervical cancer screening, the date of prior cervical cancer screening and protected health information (PHI). MHSPHP produces these patient action list reports frequently from data that is continuously updated. The methodology this system uses for identifying records, defining inclusion and exclusion criteria and creating 'patient action lists' is described in Appendix B.

The Department Head of Population Health at Naval Hospital Bremerton, Washington maintains an electronic archive of patient action lists and has developed tools to provide them to clinic providers and hospital leadership. For the purpose of this study, patient action lists were generated for all females aged 24-64 years old enrolled to Naval Hospital Bremerton and who were eligible to have a Pap test. Patient action lists were both generated for the year of 2008 (pre-PCMH implementation) and 2012 (post-PCMH implementation).

Each study subject was assigned a unique study identifier, and protected health information was removed from the data. The study identifiers were created separately for the two study periods, as a result, a study subject cannot be tracked between periods. The abstracted data was provided to the principal investigator only after protected health information was removed from the patient action lists.

For this study, the data collection form recorded the following information from the patient action lists: study period (pre- or post-PCMH), age, benefit category, active duty status, the calendar date of the last Pap test, and whether the Pap was up-to-date according to the age-appropriate screening guidelines (See Appendix C).

Outcome Measures

The primary outcome was the up-to-date cervical cancer screening rate among the eligible population during the specified time periods, before (2008) and after (2012) implementation of the PCMH. Women between the ages of 21 and 29 were considered ‘up-to-date’ (UTD) if they had a Pap test within the prior two years. If more than two years had passed since their previous Pap test, they were given a ‘not up-to-date’ (NUTD) status. Women between the ages of 30 and 64 were considered UTD if they had a Pap test within the prior three years. If more than three years had passed since their previous Pap, they were given a NUTD status. These two and three year screening intervals were based on the cancer screening recommendations[18,24] at the time these Pap tests were performed. A secondary analysis was measured to compare the cervical cancer screening rates between active duty females in the

pre- and post- PCMH implementation groups. The secondary outcome was measured to determine whether active duty females had improved screening rates in the PCMH compared to non-active duty women in the PCMH.

Data Analysis

All data was analyzed using IBM© SPSS© Statistics Version 19. Rates of up-to-date cervical cancer screening for the pre-implementation PCMH group and the post-implementation PCMH group were calculated as a percentage. Differences in screening rates between the groups were compared for statistical significance using chi-square tests. Similarly, for the secondary outcome, the screening rates between active duty females and non-active duty females were compared for statistical significance using chi-square analysis. Statistical significance was defined using a significance level of alpha = 0.05. To determine if there was an association between up-to-date cervical cancer screening status and the PCMH status, a multivariable logistic regression analysis was used to calculate adjusted odds ratio and 95% confidence intervals. In order to easily interpret the effect of of PCMH status on up-to-date Pap status, the variable of age was grouped into four year age categories, with the exception of the 60 – 64 age category, which spanned five year age difference.

Results

The 2008 and 2012 groups were similar in average age, age distribution, active duty status and up-to-date status of cervical cancer screening[Table 1]. In the pre-PCMH implementation group (2008), 6023 females met study inclusion criteria[Figure 1]. The average age was 41.03 years (SD=10.99), slightly over 97% were enrolled as a non-active duty Service member and 75.9% had an up-to-date cervical cancer screening status documented in the electronic medical record. 5537 females met study inclusion criteria in the post-PCMH group (2012)[Figure 2]. Similar to the 2008 group, the average age was 40.72 years (SD=11.50), 97% were enrolled as a non-active duty Service member and 83.5% had an up-to-date cervical cancer screening status documented in the electronic medical record. Complete demographic characteristics of the study population, including the results of an independent-sample t-test for comparison of mean ages and Chi-square tests for comparison of proportions between the two study years, are shown in Table 1.

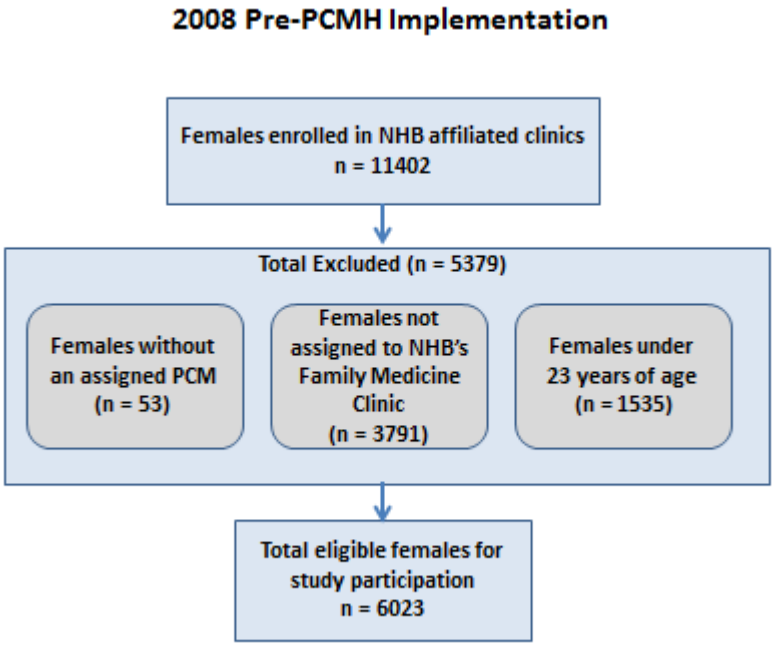

Figure 1. 2008 flowcharts of enrollment and exclusion of study participants
PCMH=patient-centered medical home, NHB=Naval Hospital Bremerton; PCM=primary care manager

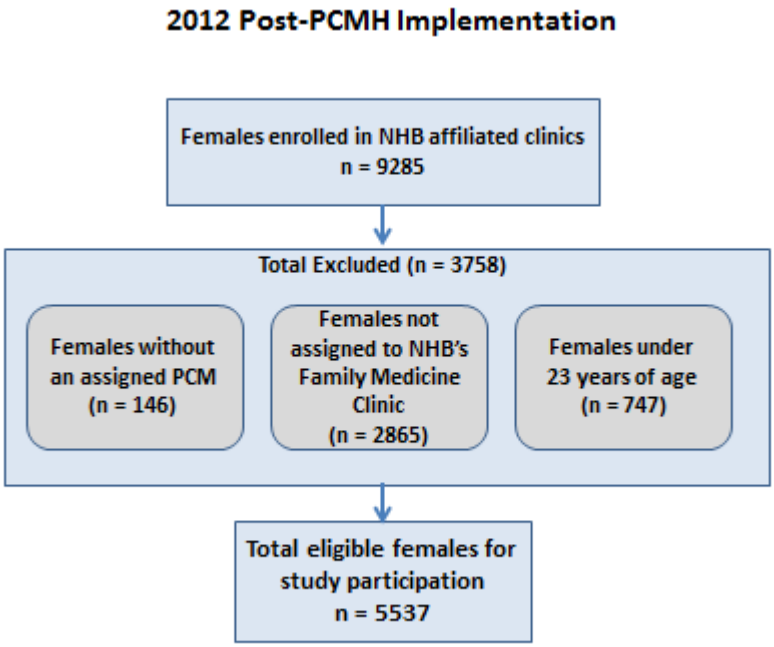

Figure 2. 2012 flowcharts of enrollment and exclusion of study participants.
PCMH=patient-centered medical home, NHB=Naval Hospital Bremerton; PCM=primary care manager

TABLE 1. STUDY PARTICIPANT DEMOGRAPHICS

	Pre-PCMH			Post-PCMH			
Age	**n**	**Mean**	**SD**	**n**	**Mean**	**SD**	**p-value***
	6023	41.03	10.99	5537	40.72	11.5	0.134
Age Groups	**n**		**%**	**n**		**%**	**p-value****
24 - 27 years old	854		14.2%	853		15.4%	
28 - 31 years old	713		11.8%	793		14.3%	
32 - 35 years old	577		9.6%	570		10.3%	
36 - 39 years old	648		10.8%	495		8.9%	
40 - 43 years old	674		11.2%	519		9.4%	
44 - 47 years old	711		11.8%	549		9.9%	
48 - 51 years old	635		10.5%	557		10.1%	
52 - 55 years old	516		8.6%	476		8.6%	
56 - 59 years old	366		6.1%	394		7.1%	
60 - 64 years old	329		5.5%	331		6.0%	
							<0.001
Benefit Category	**n**		**%**	**n**		**%**	**p-value*****
Active Duty Service Member	159		2.6%	164		3.0%	
Active Duty Family Member	2959		49.1%	2818		50.9%	
Retired Service Member	164		2.7%	152		2.7%	
Retired Family Member	2741		45.5%	2403		43.4%	
							0.124
Up-to-Date Screening	**n**		**%**	**n**		**%**	**p-value*****
Yes	4569		75.9	4624		83.5%	
No	1454		24.1	913		16.5%	<0.001

***p-value from two-sample t-test**
****p-value from linear-by-linear association test**
*****p-value from chi-square test**

Bivariate Analyses

Primary Outcome Measure

Up-to-date of cervical cancer screening rates in eligible subjects

The post-PCMH group screened a higher proportion of females than the pre-PCMH group, with a difference that is statistically significant (75.9% vs. 83.5%, p<0.001) between the two groups[Table 2]. It is important to note the statistical assumption of independent observations did not hold true in this instance, as there are some individuals who may have appeared in both time periods and cause an underestimation of p-values (see limitations section for more details).

Secondary Outcome Measure

Up-to-date cervical cancer screening rates in Active Duty Service members

Among the active duty population in the pre- and post-PCMH groups (Table 2) there was a slight drop in cervical screening rates in the 2012 group compared to the 2008 group, but this decrease was not statistically significant (94.3% vs 91.5%, p=0.315).

Table 2. Up-To-Date Cervical Cancer Screening: Bivariate Analysis

STUDY POPULATION	n	UTD %	n	NUTD %	p-value
Pre-PCMH Group	4569	75.9%	1454	24.1%	
Post-PCMH Group	4624	83.5%	2367	16.5%	<0.001
ACTIVE DUTY POPULATION	**n**	**UTD %**	**n**	**NUTD %**	**p-value**
Pre-PCMH Group	**150**	94.3%	9	5.7%	
Post-PCMH Group	**150**	91.5%	14	8.5%	0.315

Multivariable Analysis: Logistic Regression

Primary Outcome Measure

Up-to-date rate of cervical cancer screening in eligible subjects

To test if the dependent variable of up-to-date (UTD) Pap status was associated with PCMH status, a multivariable logistic regression model was created (Table 3). Instead of adjusting for age in a single multivariable logistic regression model, the data was stratified by age into separate sets of data that spanned four years (with the exception of the last age category, which spanned five years), and each strata was analyzed separately, regressing UTD status against PCMH status. This was done in order to ensure the statistical independence between the individual study subjects in any one analysis.

The regression model showed that the majority of women in the stratified age categories receiving cervical cancer screening within the post-PCMH implementation group were more likely to have an up-to-date Pap status compared to those women who received cervical cancer screening in the pre-PCMH implementation group.

Women receiving care in the post-PCMH model of care and were between the ages of 28 – 31 and 32 – 35 did not have a significantly higher odds of having an up-to-date Pap status compared to women in the same age groups and who received screening in the pre-PCMH mode of care (28 – 31: OR=0.95, 95% CI, 0.74,1.23; 32 – 35: OR=1.14, 95% CI, 0.84, 1.54).

Women who were between the ages of 36 – 39 (OR=1.78, 95% CI, 1.31, 2.43), 40 – 43 (OR=2.36, 95% CI, 1.70, 3.28), 44 – 47 (OR=2.06, 95% CI, 1.54, 2.77), 48 – 51 (OR=2.16, 95% CI, 1.63, 2.87), 52 – 55 (OR=1.77, 95% CI, 1.30, 2.41), 56 – 59 (OR=2.03, 95% CI, 1.44, 2.87), 60 – 64 (OR=4.16, 95% CI, 2.81, 6.17) and received cervical cancer screening in the post-PCMH implementation group all had significantly higher odds of having an up-to-date Pap status compared to their peers in the pre-PCMH implementation group.

Table 3. Estimate of Effect of PCMH on Up-To-Date Pap Status By Age Group: Binary Logistic Regression							
	2008		2012		Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
	n	UTD %	n	UTD %			
Age in years							
24 - 27	854	79.7%	853	80.0%	1.01	0.80, 1.28	0.914
28 - 31	713	80.1%	793	79.3%	0.95	0.74, 1.23	0.713
32 - 35	577	81.5%	570	83.3%	1.14	0.84, 1.54	0.404
36 - 39	648	77.0%	495	85.7%	1.78	1.31, 2.43	<0.001
40 - 43	674	77.4%	519	89.0%	2.36	1.70, 3.28	<0.001
44 - 47	711	75.1%	549	86.2%	2.06	1.53, 2.77	<0.001
48 - 51	635	70.9%	557	84.0%	2.16	1.63, 2.87	<0.001
52 - 55	516	73.6%	476	83.2%	1.77	1.30, 2.41	<0.001
56 - 59	366	70.2%	394	82.7%	2.03	1.44, 2.87	<0.001
60 - 64	329	62.3%	331	87.3%	4.16	2.81, 6.17	<0.001

Trend Across Age groups

A plot of the odds ratio versus age group is shown in Figure 3. Women between the ages of 60 and 64 and who had a documented Pap in the post-PCMH group had the highest odds of having an up-to-date cervical cancer screening status compared to those in the pre-PCMH group.. Women below the age of 36 had a lower odds of having an up-to-date Pap status. The graph suggests that the older the age of a woman, the stronger the effect of the PCMH had on her Pap status being up-to-date.

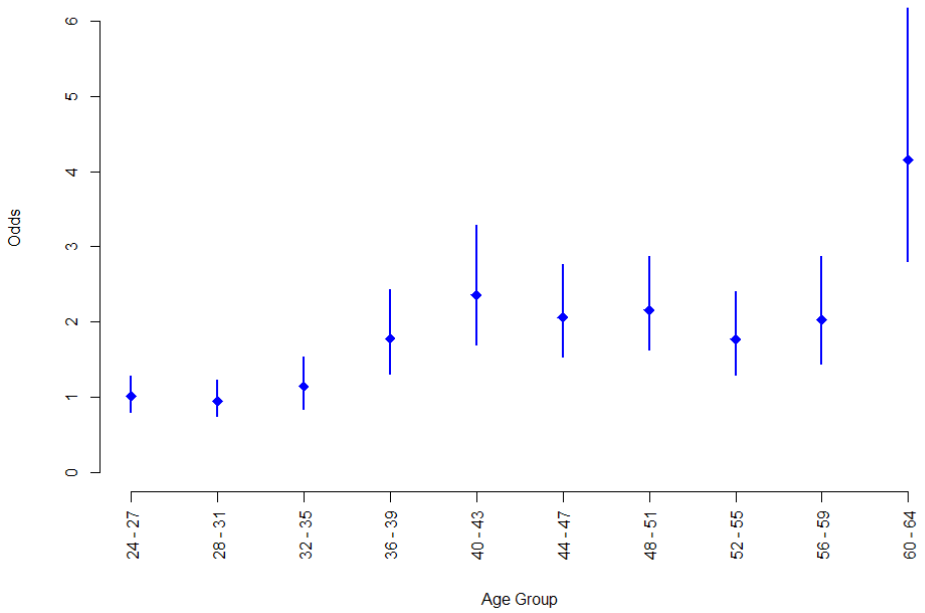

Figure 3. Effect of PCMH on Age Group

Discussion

This cross-sectional analysis demonstrated significant improvements in the cervical cancer screening rates at a Navy family medicine clinic after the introduction of the PCMH. This study showed that the women who received cervical cancer screening in the post-PCMH study group were more likely to have an up-to-date cervical screening test compared to those women in the pre-PCMH group. In addition, this study showed that the age of a woman has a significant effect on her cervical cancer screening exam status.

The implications of this study are noteworthy. This study showed that the PCMH had a stronger effect on a woman's Pap status as her age increased. As a woman's age increased, so did her odds of having an up-to-date Pap status. Within the MHS, as long as a woman is to receive cervical cancer screening in a PCMH, it could be predicted that her odds of having an up-to-date Pap would be higher than if she were to receive screening in a non-PCMH model of care.

It's important to point out that the median age at which women are diagnosed with cervical cancer is 49 years old[5]. In this cross-sectional study, women in their late thirties and older had a higher odds of being screened than those women in their twenties in the post-PCMH model. It could be theorized that the PCMH model could improve the prevention and early diagnosis of cervical cancer specifically in women over thirty, with the strongest effect seen in women over the ages of 40 and 60 years. However, many other factors, such as income status, insurance status, education level, racial/ethnic background and previous history of screening would need to be taken into account.

This study supports the idea that compared to non-PCMH primary care clinics, those primary care clinics that have implemented the PCMH model are likely the better, if not the best, choice to improve preventive cancer screening rates. The literature reinforces that providing a preventive health service, such as cervical cancer screening, is better supported in the PCMH model[82]. This can be explained by the fact that in order to become an NCQA-recognized medical home, one of the mandated NCQA elements[104] requires methods to use patient data and evidence-based guidelines to create lists and remind patients of necessary health services, including at least three different preventive care services[102].

Under the Affordable Care Act[70], insurers are now required, at no extra cost-sharing, to provide specific preventive health benefits for women. Well-woman visits, including cervical cancer screening, are included in these

preventive health benefits[105]. This provision should increase the number of women who are screened for cervical cancer. Based on the positive association between the PCMH and improved cervical cancer screening rates demonstrated in this study, the PCMH model should be implemented in cachement areas where cervical cancer screening is lower than the Healthy People 2020 target screening rate. Implementing the PCMH model could be the most effective and efficient way to improve cervical cancer screening rates, improve health disparities and further decrease cervical cancer mortality.

The findings of this study are similar to the associations previously demonstrated by Schweitzer's cohort analysis[96]. Schweitzer demonstrated that colo-rectal cancer screening rates were significantly higher after the PCMH model was implemented in a Navy family medicine clinic. This study, however, is the first observational study to specifically test the hypothesis that utilizing the PCMH model improves cervical cancer screening rates.

Limitations

This study has several limitations. Traditionally, a cross-sectional study measures both the exposure and outcome simultaneously in a specific population. Often named prevalence studies, the outcomes of interest that are identified are prevalent cases because it is known that they existed at the time of the study, but do not know their how long they've existed in that population. Cross-sectional studies are often described as being a 'snapshot' of a certain population at a specific point in time, as it captures evidence of both the potential exposure and outcome at the same time. Additionally, these analyses tend to be less time-consuming, requires no follow-up over time, cost less money to complete and can be generalized to a target population. In the case of this study, the decision to use a cross-sectional design was one way to quickly assess the effectiveness of a particular exposure (PCMH model of care) on an outcome of interest (cervical cancer screening rates) within time and financial constraints. This study, however, was not a pure cross-sectional design, as it did not measure an exposure to a population at one point in time, but rather measure two points in time in two different populations (the calendar years of 2008 and 2012). In other words, the pre-PCMH group was not exactly identical to the post-PCMH group but they were nearly uniform in size, age and benefit category distribution and representative of the target population. Because the study was not a cohort study, subjects could not be followed between the two study periods, lessening the strength of association between the PCMH and up-to-date Pap status. A prospective cohort study design may have been more effective in showing an association between up-to-date cervical cancer rates and the PCMH, as it would have had the ability to follow

subjects between the two study periods and calculate a direct measurement of risk: incidence. Temporality or cause-and-effect relationships cannot be determined in this study because this analysis was carried out at one point in time and could give no indication of the sequence of events: whether the exposure of the PCMH occurred before, after or during the onset of the studied outcome, up-to-date Pap status. A cross-sectional study design, while observational in nature, does not carry the strength of evidence that a well-designed cohort study maintains. A cohort study would have been difficult to perform in this transient military beneficiary population, as there would have been the potential for a high rate of loss to follow-up. Many individuals enrolled in military treatment facilities, whether they are active duty personnel or family members of those active duty personnel, often remain enrolled for three to four years before moving and enrolling into a different treatment facility, disrupting follow-up care. Since cervical cancer screening is currently recommended to be completed every three to five years[18], there would be at least an additional three to five years of follow-up needed to demonstrate a potential association. Currently, all primary care clinics in the MHS are required to have an established PCMH. It would be difficult to complete a prospective study using similar study populations, exposures and outcomes, as there would be no comparison group within the MHS. Due to these challenges, a cross sectional analysis was the most practical choice for this study.

Since statistical independence between observations are assumed by most statistical tests, including multivariable logistic regression, the potential lack of independence in this study needs to be addressed. Because of the likelihood of repeated data being measured amongst study participants across both study periods, and to assure the assumption of statistical independence between individuals was met, separate multivariable logistic regression models were run for each age group. Although it was impossible to detect whether a study subject was counted in both groups, the stratification of age made it possible to count the same study subject as independent observations amongst the different age groups; since an individual cannot be the same age at the two time points no individuals can appear in both PCMH groups within the same age stratum. In other words, the same woman could be counted in the 2008 and 2012 study groups. For example, if a woman over thirty years old had a Pap test completed in 2008, she would've likely been included in the pre-PCMH study group. Her next recommended Pap would be due in 2011. If she completed her next Pap on time, in 2011, then her cervical cancer screening would have been interpreted as 'up-to-date' in the post-PCMH study group. In order to lessen the possibility of study subjects being counted twice, age was stratified into four-year age groups.

Other constraints of this study may have included misclassification bias. This could have occurred if the cervical cancer screening status of study subjects were inaccurate in the electronic medical record, diluting the strength of association between the PCMH and Pap status. This could have occurred if a patient had her Pap test completed at a non-NHB affiliated clinic and did not inform her primary care manager or the medical records department to update her screening status. This would have overestimated the true up-to-date screening rates in both study groups. In addition, misclassification bias could have been present if the cervical screening status was documented differently in 2008 compared to the documentation method in 2012 in the electronic medical record. This could have resulted in over or underestimating the true screening status for either of the study periods.

Although overall screening rates were high, there are likely other factors present that contributed to lower screening rates in the NUTD groups. Previous studies[33,106,107] have shown that education level, socio-economic status, race, ethnicity, health literacy, frequency of visits to health care providers and following screening recommendations of health care providers are related to uptake of current cervical cancer screening. Personal beliefs about prevention, risk and severity of cervical cancer; trauma history, fear, embarrassment and lack of knowledge of the preventive nature of the Pap test have also been cited as barriers to obtaining cervical cancer screening[106,108,109]. Any of these factors, not just the presence of a PCMH, could have played role in whether subjects of this study had an up-to-date screening status.

Finally, this was a single-site study at one Navy family medicine clinic. These results may not be generalizable to other Navy and military family medicine clinics as well as non-military primary care clinics that utilize the PCMH model. The family medicine primary care clinic evaluated in this study mostly takes care of non-active duty beneficiaries, so this study may not be generalizable to clinics that primarily take care of a younger female active duty population. Also, the administration of the PCMH widely varies, so it is possible that two clinics that have a PCMH implemented may do so with enough variation to create a difference in the delivery of health care services, including preventive cancer screening services.

Conclusion

Within the context of Navy Medicine, confirmation of the study's hypothesis--that the PCMH improves cervical cancer screening rates in a Navy family medicine clinic--provides evidence indicating improvement in the quality of preventive cancer screening after the implementation of the PCMH model, however more research is warranted.

Globally, this study reinforces the important role the PCMH model has in improving the overall screening and detection of preventable diseases. This study successfully adds to the growing body of evidence produced by both military and civiilan healthcare systems that the PCMH model of care improves not only preventive cancer screening,[48,68,96] but increased and improved preventive screening across a broad spectrum of illnesses.[47,68,78,79,81,82,84,86,87,94]

Preventive health care screening reduces mortality, improves quality of life and saves billions of dollars, yet many studies indicate there is room for improvement[110-113]. If future research continues to show that the PCMH model is an effective system to increase the delivery of preventive health care services, there is hope that the burden of preventable conditions like cancer can be reduced, if not entirely eliminated. Within the Department of Defense and Navy Medicine, this and other similar studies can guide policy and improve the utilization of resources during these challenging fiscal times.

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APPENDIX A: NCQA REQUIREMENTS FOR PCMH

The following was adapted from:

http://www.ncqa.org/Programs/Recognition/PatientCenteredMedicalHomePCMH/BeforeLearnItPCMHNEWPAGE/PCMHEligibility.aspx

According to the National Committee on Quality Assurance (NCQA), in order to be eligible to be recognized as a patient centered medical home (PCMH), a practice must provide first contact, continuous, comprehensive, whole person care for patients across the practice. PCMH has at its foundation the Joint Principles developed by the primary care medical societies (American College of Physicians, American Academy of Family Physicians, American Academy of Pediatrics, American Osteopathic Association):

- Whole-person care
- Personal clinician provides first contact, continuous, comprehensive care
- Care is coordinated or integrated across the health care system
- Team-based care

The NCQA's PCMH Recognition Program provides six standards that a practice should meet in order to earn the title of an "NCQA-Recognized PCMH". The six standards align with the core components of primary care. http://www.ncqa.org/portals/0/Public%20Policy/PCMH_2011_fact_sheet.pdf

Practices are scored on six areas that define patient-centered medical homes:

PCMH 1: Enhance Access and Continuity

PCMH 2: Identify and Manage Patient Populations

PCMH 3: Plan and Manage Care

PCMH 4: Provide Self-Care Support and Community Resources

PCMH 5: Track and Coordinate Care

PCMH 6: Measure and Improve Performance

Six "must pass" elements are essential for PCMHs at all three recognition levels. Practices must score of at least 50% on these elements, which include:

PCMH 1, Element A: Access During Office Hours

PCMH 2, Element D: Use Data for Population Management

PCMH 3, Element C: Care Management

PCMH 4, Element A: Support Self-Care Process

PCMH 5, Element B: Referral Tracking and Follow-Up

PCMH 6, Element C: Implement Continuous Quality Improvement

These scores result in a level: 1, 2 or 3 of PCMH Recognition. Based on the level of PCMH recognition, states and other sponsors may award more money to these practices.

APPENDIX B: METHODOLOGY FOR DETERMINING RATE OF CERVICAL CANCER SCREENING

Background: The Military Health System Population Health Portal (MHSPHP) is based on 2013 Healthcare Effectiveness Data and Information Set (HEDIS®) criteria. These are a set of criteria used to benchmark treatment facilities using a common methodology and should not be confused with clinical practice guidelines. Women, age 21-64, were selected for benchmarking measurement because evidence supporting screening is strongest among this age group. The "action report" provided to medical treatment facilities (MTFs) and Managed Care Support Contractors (MCSCs) on the MHSPHP includes all TRICARE Prime/Plus enrolled women, age 21-64, regardless of continuous enrollment.

Measure Definition: Percentage of women continuously enrolled in TRICARE Prime, age 24-64 years, who had cervical cancer screening in the past three years. *NCQA is aware that cervical cancer screening recommendations for women over 30 changed in 2012 and anticipate changes in the measure definition to be proposed in 2013 with implementation in 2014.*

Numerator: Number of women continuously enrolled in TRICARE Prime, age 24-64, with coded cervical cancer screening at least once in the past three years in direct purchased care.

Denominator: Number of women enrollees as of the last day of measurement month, age 24-64, continuously enrolled during the preceding 36-month period without a documented hysterectomy. A woman whose coverage lapses for more than one month (30 days) during each previous 12-month period of enrollment is not considered continuously enrolled. Performance measures require a retrospective approach. Women are not included in the denominator for this measure until age 24 (3-year look back).

Data Sources:

- Defense Eligibility Enrollment Registration System (DEERS)
- Standard Inpatient Data Record (SIDR) (M2)
- Comprehensive Ambulatory/Professional Encounter Record (CAPER)
- Purchased Care Claims Data (NETWORK) (M2)
- Composite Health Care System (CHCS) Managed Care Platform National Enrollment Database (NED) module
- MHS CHCH lab and pathology ad hocs
- HS_Oracle ODS (formerly known as COHORT)
- AHLTA Problem List Surgical Procedure History (MDR)

- Tri-Service Workflow (TSWF) MHSPHP AIM Form
- Standard Ambulatory Data Record (SADR) (M2)*

*SADR use is limited to the identification of historical exclusions and NOT for the identification of patients to meet denominator criteria as specified below.

Methodology:

1. Use DEERS to identify women continuously enrolled in TRICARE Prime/Plus, age 24-64
2. Use HS_Oracle ODS, TSWF MHSPHP AIM, CAPER (M2), SIDR (M2) and NETWORK (M2) data to identify women who have had an outpatient or inpatient visit with cervical cancer screening
3. Use HS_Oracle ODS/CHCS laboratory and pathology "pap" ad hocs to identify women who have had a pap smear completed in direct care
4. Use CHCS Managed Care Platform NED module ad hoc report to identify Primary Care Manager (PCM) in direct care
5. Use CAPER (M2), SIDR (M2) and NETWORK (M2) data to exclude women with a history of hysterectomy and no residual cervix
6. Use AHLTA Problem List Surgical Procedure History to identify women who have a documented history of cervical pap smear in past three years or history of total hysterectomy

Data Sources & Codes:

Codes to Identify Cervical Cancer Screening in Direct Care or Purchased Care:

CPT Codes	HCPCS	ICD-9-CM Procedure
88141-88143, 88147, 88148, 88150, 88152-88155, 88164-88167, 88174, 88175	**G0123, G0124, G0141, G0143-G0145, G0147, G0148, P3001, P3001, Q0091**	**91.46**

Codes to Exclude Women With a Hysterectomy and no Residual Cervix:

CPT Codes	ICD-9-CM Codes	ICD-9-CM Procedure
51925, 56308, 57540, 57545, 57550, 57555, 57556, 58150, 58152, 58200, 58210, 58240, 58260, 58262, 58280, 58285, 58270, 58275, 58280, 58285, 58290-58294, 58548, 58550-58554, 58570-58573, 58951, 58953, 58954, 58956, 59135	**618.5, 752.43** **V Codes: V67.01, V76.47, V88.01, V88.03, V45.77 1**	**68.4-68.8**

Action Report: List of all TRICARE Prime/Plus enrolled women, age 21-64, by PCM. Identifies women with the date of their most recently documented Pap smear and those who have not had a coded exam during the past 36

months. The action report is based on current DEERS enrollment, in contrast to the HEDIS® aggregate report which specifies continuous enrollment and age constraints.

APPENDIX C: DATA COLLECTION FORM

Subject Unique Study Identifier (Pre/Post)	Age	BenCat	AD (Y/N)	Last Exam	Pap UTD (Y/N)
1.					
2.					
3.					
N.					

FIELD NAME DESCRIPTION

Study Identifier Pre-PCMH or Post-PCMH study subject

Age Age in years at time of Pap

Benefit Category (Active Duty Service Member, Active Duty Family Member, Retired Service Member, Retired Family Member)

Active duty military status at time of pap

Date of last Papanicolou smear

Up-to-date pap status within the past three years